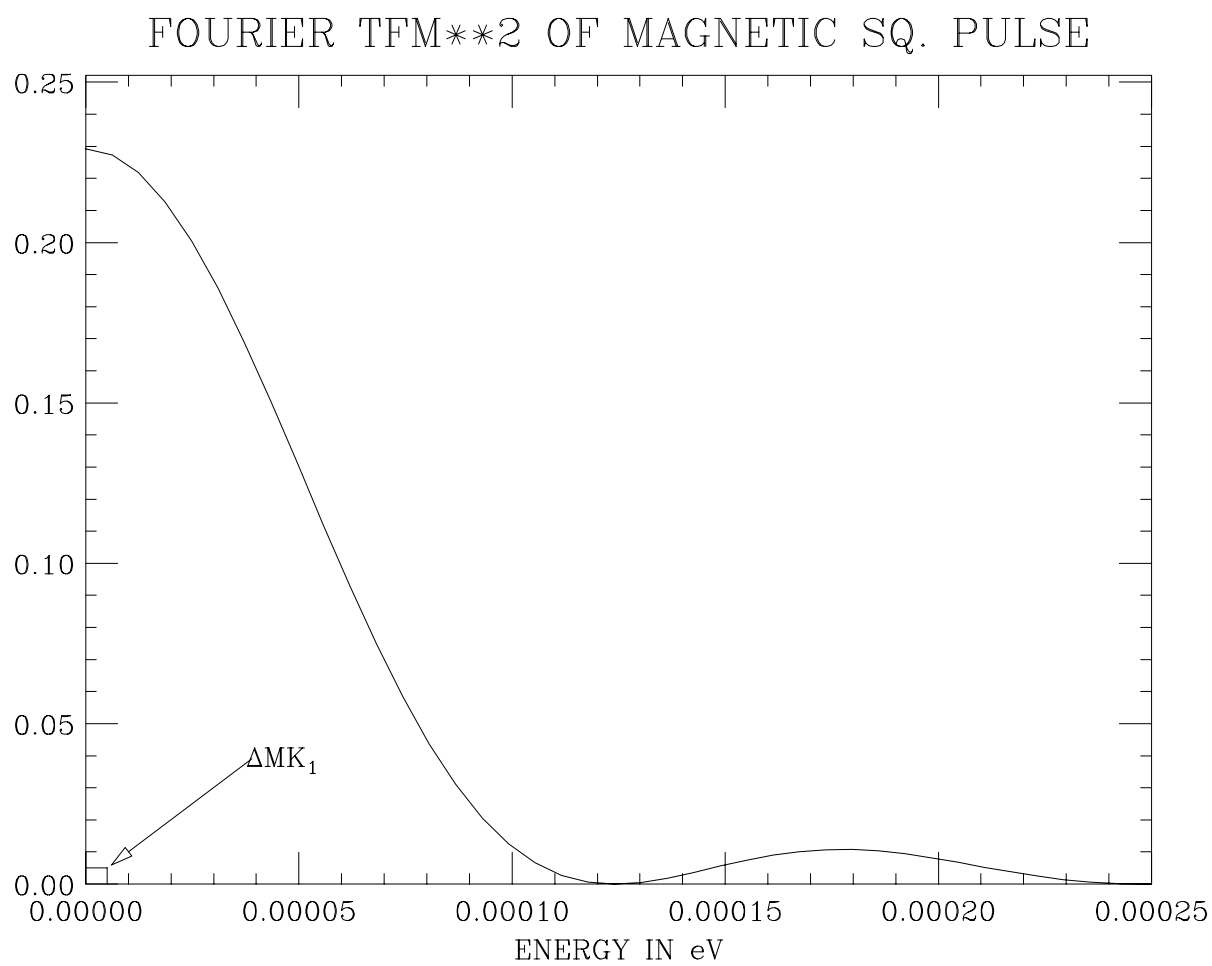
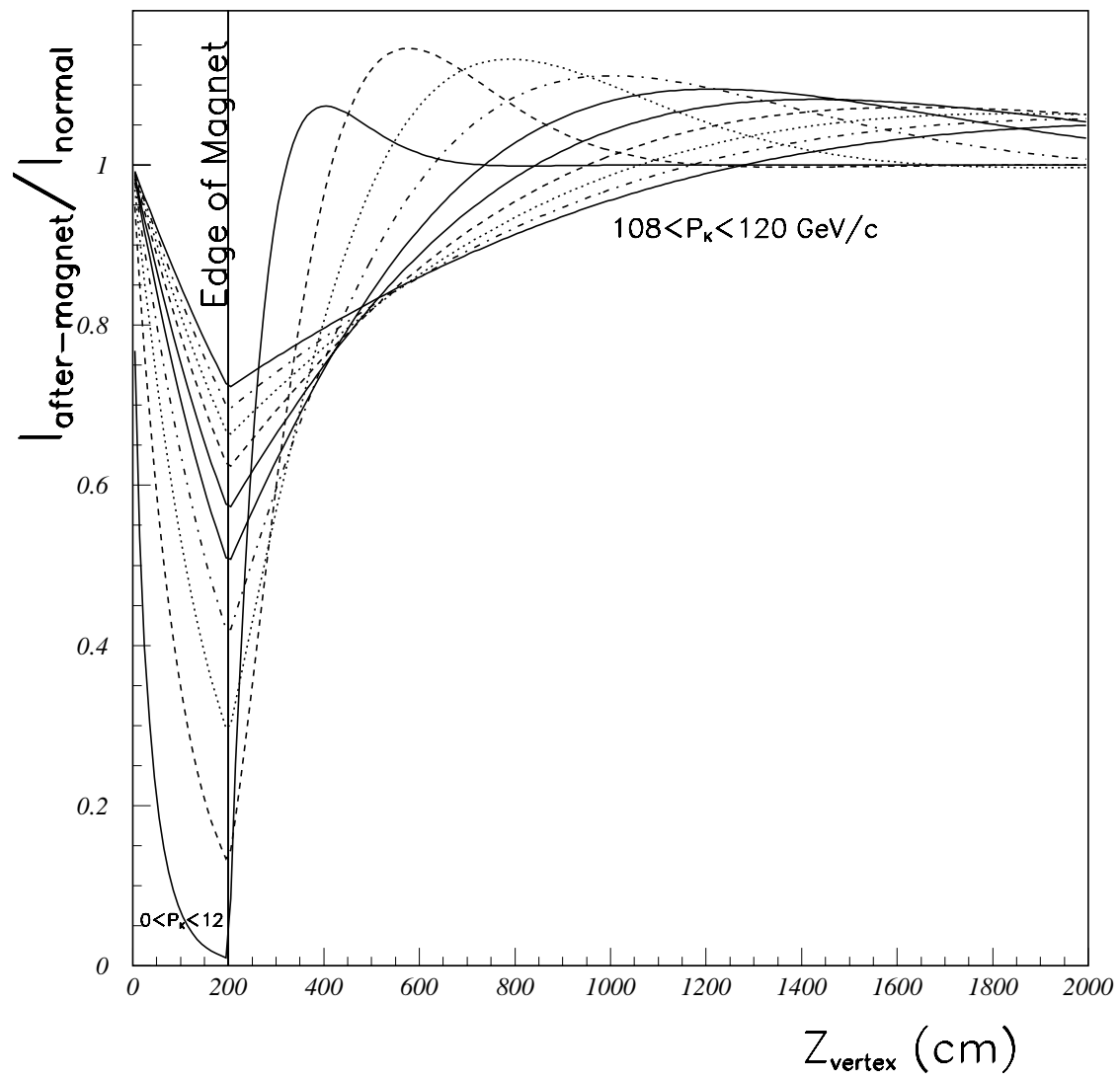


EM Regeneration of K_L in last KTeV Sweeper Magnet

1. Static B field becomes tranverse perpendicular B and E fields in K CM.
 - (a) Fourier Transform of the time pulse gives the photon energy power spectrum seen by the K. (see Fig)
 - (b) Each K intercepts about 500 photons in the energy interval corresponding to the K_1 mass width.
 - (c) Don't really expect any first order transitions



Salam and Stratthdee guess large B field will restore CP. K_1 's begin to decay away in the field. Interference returns briefly after the magnet. Effect is largest for lowest momentum, but that is when B field in K-frame is lowest. See next Fig.



The only other experiment is T.C.Bacon, et al., PL (1979) at Nimrod with 1.3 GeV kaons in a longitudinal, pulsed B field of 21T (no γ enhancement of the field). (Someone has mentioned a Chicago thesis that used a quadrupole magnet, but we don't have that reference.) Their magnet was 20 cm long, and because the decay mode was charged, they could not begin observing events for another 6.5 cm downstream. 259 decays were observed.

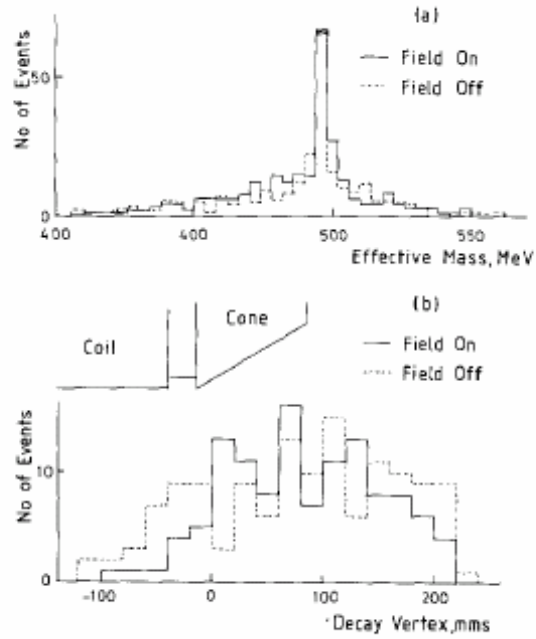
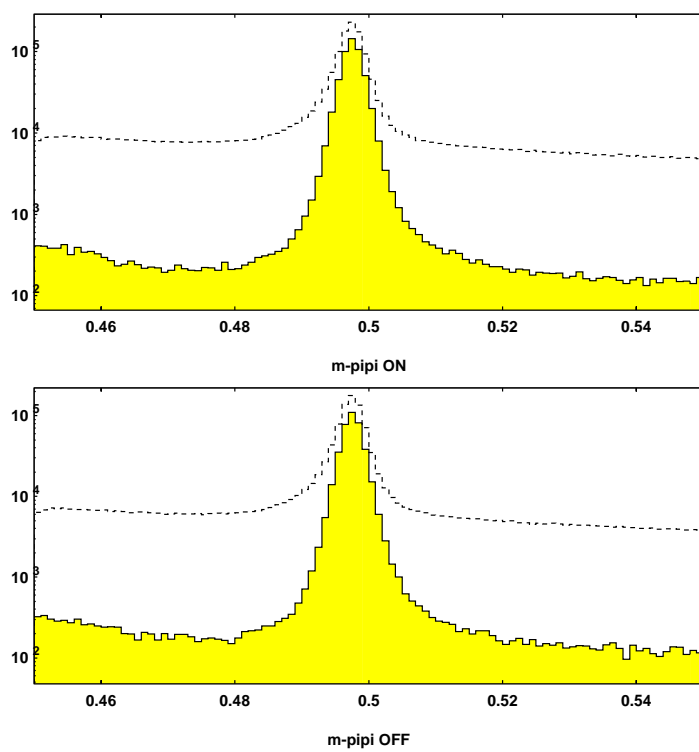


Fig. 3. (a) Effective mass distributions for events with two charged particles, both assumed to be π 's after transverse momentum and other cuts have been imposed. (b) The distributions of decay vertices for $K \rightarrow \pi^+\pi^-$ events. The fiducial volume starts at 0, about 35 mm downstream of the end of the coil.

T. C. Bacon et al., An Experiment On CP Violation In A High Magnetic Field, Phys. Lett. B bf 86, 405 (1979).

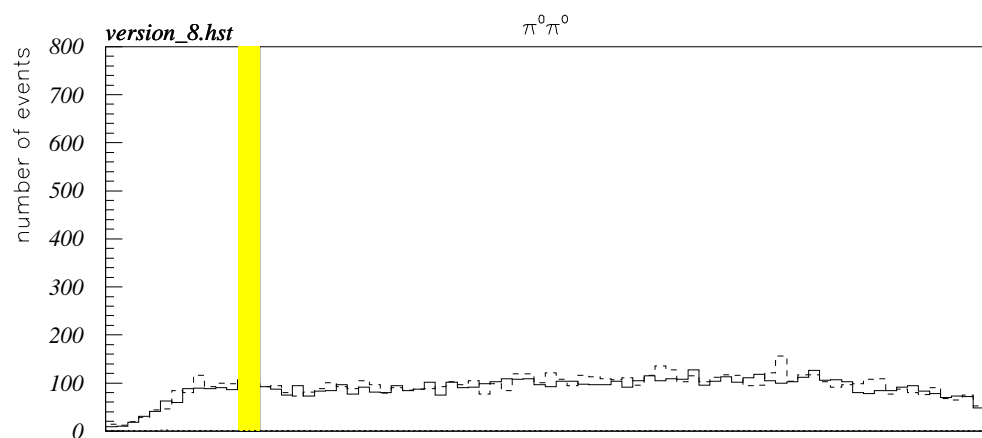
Our field in the lab is 1.8T transverse to the beam, enhanced by a factor of γ in the kaon rest system. B is typically 10X that of the Nimrod experiment. We have something like 30,000 2π decays. Our data sample also has neutral decays ($2\pi^0$ and $3\pi^0$) so that we can follow events into the magnet itself. The next figure shows our $2\pi^0$ mass peak relative to background with the present cuts. It is already much better than the Nimrod data, and the cuts can be improved.

$2\pi^0$ Mass spectrum before and after cuts

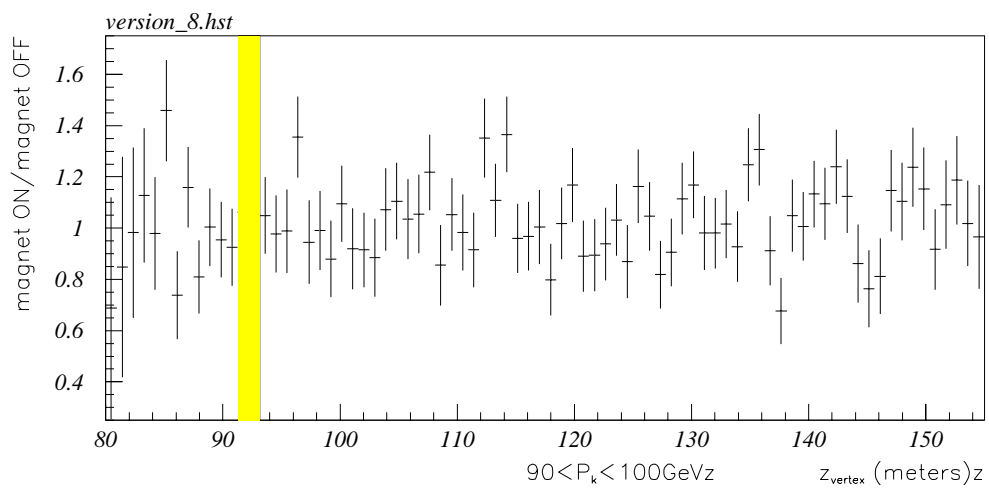


The following figures show the ratio of field ON data divided by field OFF data vs z along the beam for $2\pi^0$ events. A low momentum interval and a high momentum interval were selected. Like most of the intervals, the high momentum events seem unaffected by the field. The selected low momentum events show a troubling, but apparently insignificant “oscillation” which may even persist when plotted vs. proper time in the K rest system.

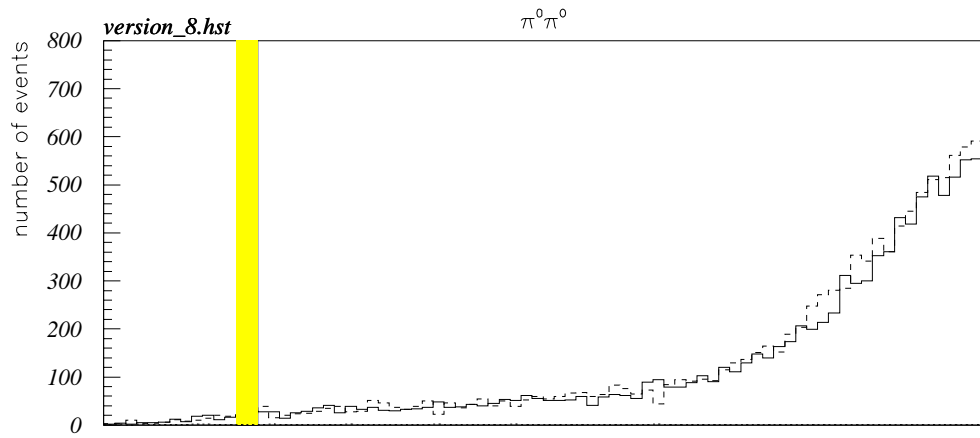
2001/02/14 20.09



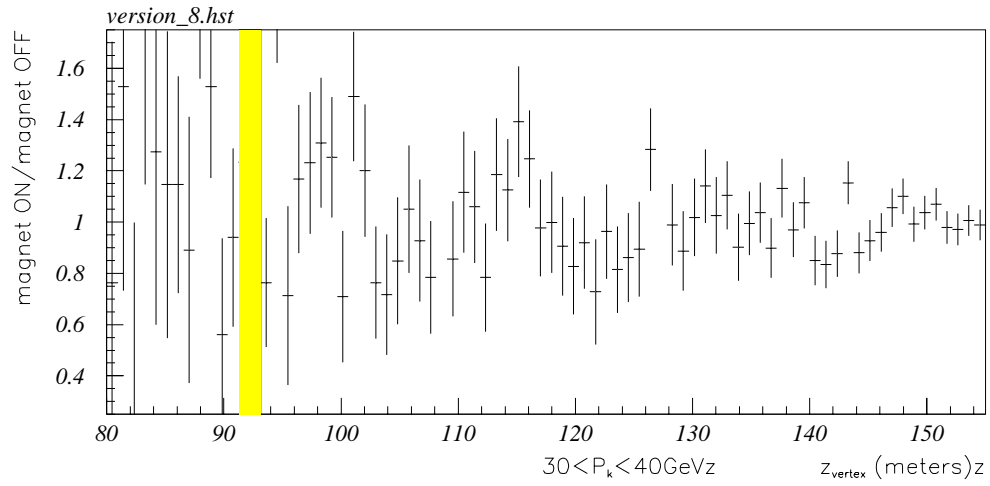
dashed is off line is on



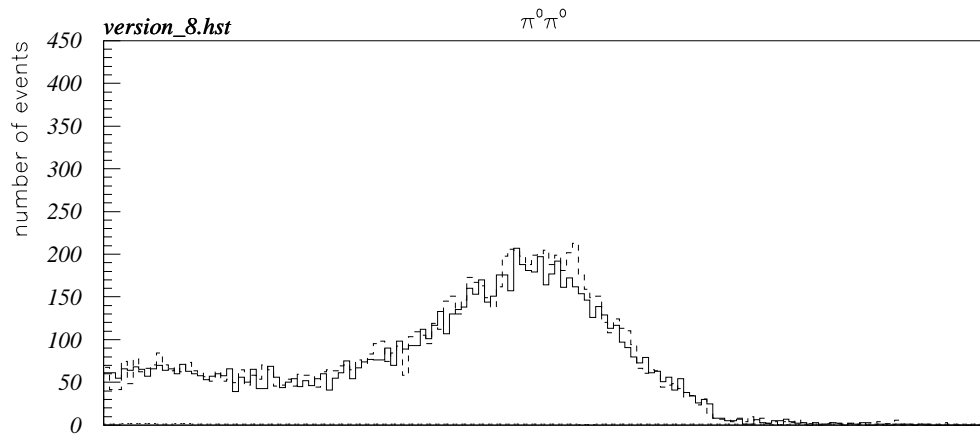
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